

1.2 Solving Linear Systems by Substitution

Graphically, the solution to a system of linear equations is the point(s) where the lines intersect.

Algebraically, we can:

1. isolate one variable in one equation.
2. substitute the isolated variable into the other equation.
3. solve for the single variable.
4. sub the answer from step 3 into the isolated equation from step 1 to find the other variable.

Ex.1. Solve $y = 3x - 2$ and $x = y - 2$

Sub the y-value from the first equation into the second equation

$$\textcircled{1} y = 3x - 2$$

$$\textcircled{2} x = y - 2$$

Sub ② into ①

$$y = 3x - 2$$

$$y = 3(y - 2) - 2$$

$$y = 3y - 6 - 2$$

$$y - 3y = -8$$

$$\frac{-2y}{-2} = \frac{-8}{-2}$$

$$y = 4$$

Sub $y = 4$ into ②

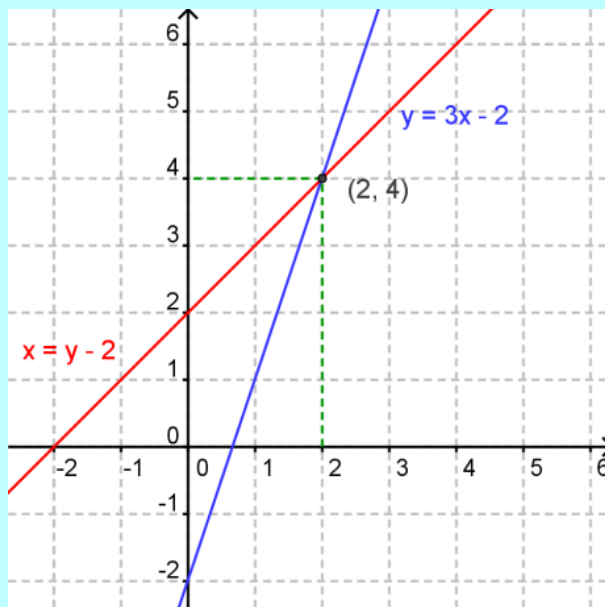
$$x = y - 2$$

$$x = 4 - 2$$

$$x = 2$$

∴ the solution is $(2, 4)$

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The solution is (2, 4), or $x = 2$ and $y = 4$.

To perform a formal check of the solution, sub these values into each equation and compare sides.

$$y = 3x - 2$$

$$\begin{array}{lcl} \text{L.S.} = y & \text{R.S.} = 3x - 2 & \\ = 4 & = 3(2) - 2 & \\ & = 4 & \end{array}$$

$$x = y - 2$$

$$\begin{array}{lcl} \text{L.S.} = x & \text{R.S.} = y - 2 & \\ = 2 & = 4 - 2 & \\ & = 2 & \end{array}$$

Ex.2. Solve $x + 4y = 6$ and $2x - 3y = 1$

How do we decide which variable to isolate first?

① $x + 4y = 6$

② $2x - 3y = 1$

isolate ①

$x + 4y = 6$

$x = -4y + 6$

sub ① into ②

$2x - 3y = 1$

$2(-4y + 6) - 3y = 1$

$-8y + 12 - 3y = 1$

$-11y = 1 - 12$

$-11y = -11$

$\frac{-11y}{-11} = \frac{-11}{-11}$

$y = 1$

sub $y = 1$ into ①

$x + 4y = 6$

$x + 4(1) = 6$

$x = 6 - 4$

$x = 2$

 \therefore the P.O.I is
(2, 1)

Try this one:

Ex.3. Solve $2y = x + 5$ and $x - 4y = 0$.isolate ②

$x = 4y$

sub ② into ①

$2y = x + 5$

$2y = (4y) + 5$

$2y = 4y + 5$

$2y - 4y = 5$

$-2y = 5$

$y = \frac{5}{-2}$

$y = \frac{x}{4}$

$2y = x + 5$

$2\left(\frac{x}{4}\right) = x + 5$

$\frac{2x}{4} = x + 5$

$\frac{1}{2}x = x + 5$

$2y = x + 5$

$2\left(\frac{5}{-2}\right) = x + 5$

Assigned Work:

p. 39-40 # 3, 4bf, 5be, 9bcef



Attachments

Basic 2D Grid.agg